

Posttraumatic Stress Disorder and Substance Use in Inner-City Adolescent Girls

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Abstract: The purpose of this study is to examine rates of nicotine, marijuana, and alcohol use as well as patterns of problematic substance use and posttraumatic stress disorder (PTSD) symptoms in inner-city adolescent girls. One hundred four adolescents who obtained medical care at a hospital-based adolescent clinic were systematically surveyed for trauma exposure, posttraumatic stress symptoms, and substance use. A subset ($N = 54$, 52%) of girls completed a semistructured psychiatric diagnostic interview (K-SADS-PL) to ascertain timing of PTSD symptoms relative to substance use. Compared with traumatized girls without PTSD, girls with full and partial PTSD were significantly more likely to use nicotine, marijuana, and/or alcohol on a regular basis. Fifteen girls met criteria for both PTSD and a substance-use disorder. For 80% of these girls, the age of onset of PTSD was either before or concurrent with the onset of their substance-use disorder. Inner-city adolescent girls with PTSD exhibit problematic substance use and may be at high risk of developing a comorbid substance-use disorder.

Key Words: PTSD, alcohol, marijuana, adolescent

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Over the past decade, several large epidemiological studies of Vietnam combat veterans (Kulka et al., 1990) and traumatized adult civilians (Kessler et al., 1995) have documented a high comorbidity between posttraumatic stress disorder

(PTSD) and substance-use disorders (SUDs). In these studies, 73% of Vietnam veterans with PTSD met criteria for lifetime alcohol abuse/dependence (Kulka et al., 1990) and 35% and 29% of civilians with PTSD met criteria for lifetime alcohol abuse/dependence and lifetime drug abuse/dependence, respectively (Kessler et al., 1995). In other samples of adult substance abusers, rates of current PTSD have varied from 12% (Goldenberg et al., 1995) to 34% (Grice et al., 1999).

Despite the strong association between these two disorders in adults, very little research has explored the relationship between trauma, PTSD, and problematic substance use in adolescents. Adolescence is a crucial developmental period in which to study these relationships because adolescents are at high risk for exposure to community and/or family-based violence (Singer et al., 1995), and the adolescent years herald a period of drug experimentation when substance use can transition into a substance abuse disorder (SUD; Burke et al., 1990). In one study, Clarke et al. (1997) examined the types of trauma experienced by adolescents diagnosed with alcohol dependence and found them to be 6 to 12 times more likely to have a childhood history of physical abuse and 18 to 21 times more likely to have a history of sexual abuse than community control adolescents. In a second study, Lipschitz et al. (2000a) reported a relationship between posttraumatic stress symptoms and problematic substance use in a sample of adolescents in a psychiatric hospital that was significant for girls but not for boys. In a third study, Deykin and Buka (1997) studied risk factors for PTSD in 397 chemically dependent adolescents enrolled in substance abuse treatment facilities. Twenty-nine percent of youngsters met comorbid DSM-III-R (American Psychiatric Association, 1987) diagnoses for lifetime PTSD and an SUD. Nineteen percent of youngsters met criteria for comorbid diagnoses of current PTSD and an SUD. Once again, rates of comorbid PTSD and an SUD were much higher in girls than in boys.

To date, the existing empirical literature on the comorbidity of PTSD and substance abuse has focused on adolescents seeking psychiatric and/or substance abuse treatment, not on community-based adolescents who are not seeking

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psychiatric treatment but who nonetheless are at high risk for trauma exposure, PTSD, and substance abuse. For the past several years, we have surveyed inner-city adolescent girls who obtain regular medical care at a hospital-based adolescent clinic. Most of these girls have experienced one or more types of DSM-IV (American Psychiatric Association, 1994) defined Criterion A or qualifying traumas, most commonly community-based violence and vicarious trauma; they report moderate levels of posttraumatic stress symptoms. In a recent study, we reported that 13% and 11% of 90 of these girls met full and partial criteria respectively for PTSD (Lipschitz et al., 2000b). Compared with traumatized girls without PTSD, girls with full PTSD had more functional impairment as evidenced by significantly higher rates of school failure, suspensions, and arrests. They also reported significantly higher rates of nicotine and marijuana use.

To further explore the relationship of PTSD symptomatology and problematic substance use in this population, we systematically surveyed a larger group of inner-city adolescent girls who are patients at the same adolescent clinic. Our screening measures recorded the types and frequencies of different DSM-IV (APA, 1994) based Criterion-A traumas, posttraumatic stress symptoms in the past month and patterns of alcohol and/or marijuana use. A subset of girls ($n = 54$) agreed to participate in the second part of our assessment and completed a semistructured psychiatric diagnostic interview (the K-SADS-PL) that enabled us to document rates of alcohol and marijuana abuse/dependence with age of onset of their substance abuse relative to trauma and PTSD symptoms. Thus, the aims of this study were to: 1) compare rates of nicotine use and problematic marijuana and alcohol use between traumatized girls with PTSD and traumatized girls without PTSD, and 2) describe age of onset for PTSD symptoms relative to substance use in girls with histories of PTSD and substance abuse.

METHODS

Subjects

Over an 8-month period, clinicians asked a nearly consecutive series of adolescent girls who had made routine medical appointments at a hospital-based adolescent clinic if they wished to participate in the study. The Human Investigations Committee of the Yale University School of Medicine/Yale-New Haven Hospital approved the research protocol. After a complete description of the study to each participant, written informed consent was obtained. Ninety-nine percent of patients who were asked agreed to participate in the initial screening assessment, and they were reimbursed financially for their efforts. Of the 104 participants, 88 (85%) were African American; 7 (7%) were Latino; 3 (3%) were Caucasian; and 6 (5%) were of other ethnicity. Participants ranged in age from 12.8 to 20.8 years ($M = 17.2$, $SD = 1.5$

years). Eighty-three percent of them attended high school and had a mean of 10 ($SD = 2.7$) years of education. Forty-nine percent of their families received welfare assistance. There were no significant demographic differences between our study sample and the overall population using this clinic. Fifty-four girls (52%) completed the second part of the assessment, a semistructured psychiatric diagnostic interview. They ranged in age from 12.8 to 19.6 years ($M = 16.6$, $SD = 1.4$ years) and 83% were African American. Participants who completed the diagnostic interview were significantly younger than participants who did not complete the interview ($t = 4.67$, $df = 102$, $p < 0.001$), but there were no other significant demographic or clinical differences between these groups (Table 1).

Procedure

After her medical appointment, each participant completed a battery of standardized self-report questionnaires designed to assess substance use, types of traumatic event exposure, current posttraumatic stress symptoms, and general psychopathology (Lipschitz et al., 2000b, for details of the measures used). Ninety-two subjects endorsed at least one qualifying DSM-IV trauma (APA, 1994) and were interviewed by a Master's-level research associate for chronology of traumatic events and for current symptoms of PTSD using the Child and Adolescent PTSD Checklist (Amaya-Jackson et al., 2000). To establish psychiatric diagnoses of SUDs and to determine the age of onset of their substance use relative to their trauma history and posttraumatic stress symptoms, all youngsters were invited back to complete the second part of

TABLE 1. Types of Traumatic Interpersonal Experiences Reported by Inner-City, Adolescent Girls at a Primary Care Clinic ($N = 104$).

Type of Trauma	<i>N</i> (%)
Witness to Community Violence	91 (88)
Witness Shooting	56 (54)
Witness Stabbing	44 (42)
Witness Homicide	14 (15)
Victim of Community Violence	46 (43)
Threatened shooting/stabbing	70 (66)
Victim of physical assault	20 (19)
Witness to Home Violence	42 (40)
Witness to Sexual Assault	19 (18)
Sexual Abuse/Assault	41 (40)
Intra-familial	12 (11)
Extra-familial	36 (35)
Physical Abuse	43 (41)
Vicarious Trauma ^a	70 (67)

^aDefined as hearing about the homicide of a close friend or relative

the assessment, the Schedule for Affective Disorders and Schizophrenia for School Aged Children—Present and Lifetime version (K-SADS-PL), a semistructured psychiatric diagnostic interview (Kaufman et al., 1997). This interview took approximately 2 hours. Fifty-four youngsters completed the K-SADS-PL. Two youngsters did not complete the interview, 30 youngsters agreed to do the interview but did not keep the following three consecutive appointments and were lost to follow-up, and 18 youngsters chose not to enroll in this part of the study.

Measures

The Child Exposure to Violence Checklist (CEVC) (Amaya-Jackson L [1998], Unpublished manuscript, Child Exposure to Violence Checklist, Durham, NC: Duke University Medical Center.) is a 33-item checklist. It uses a 5-point Likert scale ranging from “never” to “more than 10 times” to assess frequency of exposure to community and family-based violence. Experiences sampled include being the victim of, witness to, and/or perpetrator of shootings, stabbing, homicide, and family violence. Four questions assess sexual and physical abuse. Vicarious trauma is assessed by asking subjects whether they have heard about the homicide of a close friend or relative. Although, psychometric information about this survey is limited, we analyzed internal consistency and test-retest reliability in a group of 130 adolescent inpatients. We found good internal consistency with coefficient alphas ranging from .51 to .90 for each violence category and 1-week test-retest reliability of kappa coefficients of .47 to .85 for the different categories of violence (Fehon et al., 2001).

The Child and Adolescent Posttraumatic Stress Disorder Checklist is a 28-item scale that asks participants to rate the degree to which each of the 17 symptoms of PTSD has been present during the past month (Amaya-Jackson et al., 2000). This scale is derived from DSM-IV (APA, 1994) criteria and uses a 4-point Likert severity scale from 0 to 3, corresponding to “not at all” to “all of the time.” The checklist can also be used to generate a diagnosis of PTSD based on three possible symptom thresholds (*i.e.*, presence of symptoms, “some of the time,” “most of the time,” and “all of the time”). For this study, we instructed participants to respond to the Child PTSD checklist based on the “most upsetting” event that they endorsed on the CEVC. To establish a diagnosis of PTSD, we included only symptoms that had been endorsed as “most of the time.” For the 54 girls who completed the K-SADS-PL and the Child PTSD checklist, there was an 87% agreement between diagnoses of current PTSD using the two measures ($\kappa = 0.59$).

Alcohol and drug use was assessed using the Personal Experience Screening Questionnaire (PESQ; Winters, 1991), a 40-item checklist that screens for problematic adolescent alcohol and drug use. The questionnaire assesses substance-

use severity, grade in which regular marijuana and alcohol use starts, and the psychosocial impact of substance use and scores are normalized for male and female adolescents aged 12 to 18 years.

All subjects were asked about their amount and age of onset of nicotine use in a general questionnaire.

All psychiatric diagnoses including those of alcohol abuse/dependence and/or cannabis abuse/dependence were made using the Schedule for Affective Disorders and Schizophrenia for School Aged Children—Present and Lifetime version (K-SADS-PL; Kaufman et al., 1997). The K-SADS-PL is a well-established, semistructured diagnostic interview that provides assessments of present episode and lifetime history of psychiatric illness in children and adolescents according to DSM-IV criteria (Kandel et al., 1999). It has good test-retest reliability and inter-rater reliability and has been widely used in clinical research and practice.

Statistical Analyses

We used frequency counts and descriptive analyses to assess rates of trauma exposure, PTSD symptomatology, and problematic substance use. Differences in the amounts and patterns of regular substance use in girls with full PTSD, partial PTSD, and no PTSD were assessed with a series of one-way analyses of variance with Tukey post hoc comparisons and χ^2 tests. For these analyses we used a sample size of 92 subjects—those participants who endorsed a DSM-IV-defined (APA, 1994) Criterion-A trauma—and, using data from the Child PTSD checklist, we compared three groups of girls: girls who met criteria for full PTSD, girls who met criteria for partial PTSD, and girls without either full or partial PTSD (no PTSD). Our definition of partial PTSD was based on the definition used by the National Vietnam Veterans Readjustment Survey in which a partial PTSD diagnosis is assigned when at least one re-experiencing symptom, one avoidance symptom and two hyperarousal symptoms are present (Kulka et al., 1990). We used this definition of partial PTSD and a similar PTSD classification in a previous study of inner-city adolescent girls with PTSD (Lipschitz et al., 2000b). The relationship of PTSD to substance use was explored using multiple regression analyses with substance involvement as the outcome variable and age, number of traumas, and degree of PTSD symptomatology as the independent factors. To examine the order of age of onset of PTSD relative to a substance use disorder from the K-SADS-PL data, we used descriptive analyses. All tests were two-tailed with significance set at $p < 0.05$.

RESULTS

Rates of Trauma and PTSD

Table 1 lists a range of community- and family-based traumas and shows the number and percentage of the entire sample ($N = 104$) who experienced each type of trauma.

Seventy-four percent ($N = 77$) of this sample had exposure to two or more traumas and the mean number of types of trauma experienced was 3.05, $SD = 2.12$ (range = 0 to 10). Ninety-two girls reported emotional responses of extreme horror or helplessness (*i.e.*, Criterion A.2) to their trauma(s). For these girls, the most common types of identified traumas included sexual abuse/assault ($N = 20$, 22%); vicarious trauma ($N = 20$, 22%; defined as hearing about a homicide of a close friend or relative), followed by witnessing community violence ($N = 19$, 21%), and witnessing family violence ($N = 17$, 18%). The mean age of occurrence of their most upsetting trauma was 13.1, $SD = 3.8$ years (range = 3–20 years) and the mean age of the most recent trauma exposure was 15.5, $SD = 2.4$ years (range = 7–20 years). Fourteen girls met symptom criteria for a diagnosis of current PTSD, representing 15% of the 92 girls who reported at least one qualifying, DSM-IV based Criterion-A trauma. Eight girls met symptom criteria for partial PTSD. This represents 8% of the total sample and 9% of the 92 girls who had experienced a qualifying trauma. Of 92 traumatized girls, 55 (60%) met current re-experiencing symptom criteria, 29 girls (32%) met avoidance symptom criteria, and 27 girls (29%) met hyperarousal symptom criteria.

Rates of Substance Use and Misuse

Table 2 lists the frequency of alcohol and marijuana use for this sample of inner-city adolescent girls ($N = 104$).

In this study, 41% of the girls ($N = 43$) smoked cigarettes and reported a mean age of onset of nicotine use of 13.7, $SD = 1.7$ years. Fifty-six percent of the girls ($N = 57$)

had used marijuana in the past year, while 17% ($N = 18$) reported regular use (defined as use in excess of 40 times). Twenty-seven percent of the girls in this study ($N = 28$) had bought drugs from a dealer and 16% of girls ($N = 17$) personally sold drugs. Ten percent of the girls started to get high on a once-a-week basis in grades 7 and 8; sixteen percent of girls began using on a regular basis in grades 9 and 10. One girl began regular use before grade 6. Seventy percent of girls had drunk alcohol, but only 7% of girls ($N = 8$) reported getting drunk on a weekly basis in the preceding year. Only 4% of this sample had used cocaine/crack and/or psychedelics in the preceding year.

Using cut scores normalized by age and gender on the PESQ, 21% ($N = 22$) of adolescents endorsed problems with marijuana and alcohol use. Problematic drug and alcohol use (scores on the PESQ) were significantly correlated with re-experiencing symptoms (Pearson's $r = .34$, $df = 103$, $p = 0.001$), avoidance symptoms (Pearson's $r = .28$, $df = 103$, $p = 0.004$) and hyperarousal symptoms (Pearson's $r = .35$, $df = 103$, $p < 0.001$).

PTSD and Patterns of Substance Use

Table 3 reports the number and percentage of traumatized girls ($N = 92$) with full, partial, and no PTSD who used nicotine, marijuana, and alcohol. Problematic patterns of substance use for these three groups of girls also are displayed. There were significant group differences in nicotine use ($\chi^2 = 15.7$, $df = 2$, $p < 0.001$), regular marijuana use ($\chi^2 = 9.37$, $df = 2$, $p = 0.009$), and regular alcohol use ($\chi^2 = 18.4$, $df = 2$, $p < 0.001$) between girls with full PTSD, girls with partial PTSD, and girls with no PTSD.

Posthoc analyses showed there were significant differences in nicotine and marijuana use ($\chi^2 = 12.6$, $df = 1$, $p <$

TABLE 2. Patterns of Marijuana and Alcohol Use in Urban, Inner-City Adolescent Girls ($N = 104$)

Marijuana		Alcohol	
Frequency of use in past year	N (%)	Frequency of use in past year	N (%)
1–5 times	23 (22.)	1–5 times	35 (33.6)
6–19 times	9 (8.6)	6–19 times	13 (12.5)
20–40 times	7 (6.7)	20–40 times	4 (3.8)
>40 times	18 (17.3)	>40 times	7 (6.7)
Earliest marijuana use		Earliest alcohol use	
Grade 6 or before	5 (4.8)	Grade 6 or before	14 (13.4)
Grades 7–8	21 (20.1)	Grades 7–8	20 (19.2)
Grades 9–10	27 (26.)	Grades 9–10	25 (24.)
Grades 11 and above	10 (9.6)	Grades 11 and above	11 (10.5)
High once a week		Drunk once a week	
Grade 6 or before	1 (1.)	Grade 6 or before	1 (1.)
Grades 7–8	11 (10.5)	Grades 7–8	8 (7.6)
Grades 9–10	17 (16.3)	Grades 9–10	4 (3.8)
Grades 11 and above	7 (6.7)	Grades 11 and above	3 (2.8)

TABLE 3. Nicotine, Marijuana and Alcohol Use in Traumatized, Inner-City Adolescent Girls with Full, Partial and No PTSD ($N = 92$)

	Full PTSD ($n = 14$) N (%)	Partial PTSD ($n = 8$) N (%)	No PTSD ($n = 70$) N (%)	χ^2	P
Ever Used					
Nicotine ^a	12 (86)	5 (63)	20 (31)	15.7	<.001
Marijuana ^a	12 (86)	6 (75)	33 (51)	6.7	.03
Alcohol ^b	10 (71)	7 (87)	31 (48)	6.4	.04
Regular Use ^c					
Marijuana ^a	10 (71)	3 (38)	20 (29)	9.37	.009
Alcohol	5 (36)	4 (50)	5 (8)	18.4	<.001

^aSignificant post-hoc differences between group with full PTSD compared to group with no PTSD

^bSignificant post-hoc differences between group with partial PTSD compared to group with no PTSD

^cRegular use is defined as use "greater than 40 times"

0.001; $\chi^2 = 5.18$, $df = 1$, $p = 0.02$) but not in alcohol use ($\chi^2 = 1.88$, $df = 1$, $p = ns$) between the group with full PTSD compared with traumatized girls without PTSD. There were also significant differences in alcohol use between the group with partial PTSD and the group with no PTSD ($\chi^2 = 3.78$, $df = 1$, $p = 0.05$). There were no significant differences in nicotine, alcohol, or marijuana use between girls with full PTSD compared with girls with partial PTSD.

Compared with girls with no PTSD, girls with full PTSD were significantly more likely to use marijuana ($\chi^2 = 9.33$, $df = 1$, $p = 0.002$), but not alcohol ($\chi^2 = 1.65$, $df = 1$, $p = ns$) on a regular basis.

In a linear regression analysis using the entire sample ($N = 104$), we used problematic substance use (Score on the PESQ) as the outcome measure and entered age (in years), total number of traumas reported, and degree of posttraumatic stress symptomatology (score on Child and Adolescent PTSD checklist) as predictor variables. (Table 4a). This model accounted for 23% of the variance in self-reported problematic substance use and both the total number of trauma ($t[95] = 3.46$, $p = 0.001$) and degree of posttraumatic stress symptomatology ($t[95] = 2.00$, $p = 0.048$) contributed to the degree of substance use. In an ordinal logistic regression model we used amount of cigarettes smoked (none, a few (1–10/d), a lot (>10/d) as the outcome measure and entered the same 3 predictor variables into the equation (Table 4b). This model accounted for 16.2% of the variance in nicotine use. The amount of posttraumatic stress symptomatology ($z = 4.88$, $p = 0.03$) and the number of traumas ($z = 3.95$, $p = 0.05$) contributed significantly to the amount of cigarettes smoked.

Age of Onset of PTSD Relative to an SUD using the K-SADS-PL Data

Fifty-four girls completed the psychiatric diagnostic interview, the K-SADS-PL. As seen in Table 5, apart from age (girls who completed the interview were significantly younger than girls who did not complete the interview, $t = 4.83$, $p < 0.001$), there were no other significant clinical or demographic differences between the two groups of girls. Of the 54 girls who completed the K-SADS-PL interview, 11 girls (20%) met DSM-IV criteria for current PTSD, 7 girls

TABLE 4b. Logistic Regression Analysis Predicting Nicotine Use in Inner-City, Adolescent Girls ($N = 104$)

Dependent Variable	Estimate	SE	Odds Ratio (95% CI)	sig
Age	-1.0	0.14	0.57 (-0.37, 0.16)	ns
PTSD symptoms	0.10	0.05	1.11 (1.01, 1.21)	0.027
Total # traumas	0.21	0.11	1.24 (1.01, 1.52)	0.047

(13%) met criteria for lifetime PTSD only and an additional 12 girls (22%) had partial PTSD. Age of onset of PTSD symptoms ranged from 5 to 17 years (Mean = 13.5, SD = 3.2 years). Thirteen girls (24%) met DSM-IV criteria for current marijuana abuse or dependence, three girls (5%) met criteria for lifetime marijuana abuse, and six girls (11%) had some symptoms of cannabis abuse. Age of onset of cannabis abuse ranged from 13 to 18 years (Mean = 15.0, SD = 1.5 years). Two girls (4%) met DSM-IV criteria for current alcohol abuse, three girls (5%) met criteria for lifetime alcohol abuse, and two girls (4%) had some symptoms of alcohol abuse. Age of onset of alcohol abuse ranged from 13.5 to 18 years (Mean = 15.3, SD = 1.2 years). Additional current psychiatric Axis I diagnoses for these 54 girls included a major depressive disorder ($N = 6$, 11%), dysthymia ($N = 3$, 5.5%), adjustment disorders ($N = 4$, 18.5%); other anxiety disorders (such as social anxiety disorder, simple phobia, and separation anxiety disorder; $N = 12$, 22%) and disruptive behavioral disorders (such as attention deficit hyperactivity disorder, oppositional defiant disorder, and conduct disorder; $N = 7$, 13%).

Of the 30 girls who met partial or full criteria for PTSD on the K-SADS-PL, 15 girls (50%) had a comorbid substance use disorder (either alcohol or cannabis abuse/dependence or both). Six girls (40%) had an age of onset of PTSD that preceded the age of onset of their substance use disorder, six girls (40%) had a simultaneous age of onset of PTSD and their substance use disorder, and three girls (20%) had onset of their substance use disorder before onset of their PTSD.

DISCUSSION

In this study of primarily urban, minority, inner-city adolescent girls, 41% used nicotine, 56% had tried marijuana, and 70% had drunk alcohol. Our 41% rate of nicotine use is comparable to rates of nicotine use reported in studies of community-based adolescents from a range of sociodemographic strata. For example, in the Methods for the Epidemiology of Child and Adolescent Mental Disorders (MECA) Study of 401 adolescents aged 14–18 years, 39.8% of adolescents reported smoking cigarettes (Kandel et al., 1999). Likewise, the National Household Survey of Drug Abuse (NHSDA; Substance Abuse and Mental Health Administration, 1993) reported a 42% rate of smoking in teenagers.

TABLE 4a. Multiple Regression Analyses Predicting Problematic Substance Use in Inner-City, Adolescent Girls ($n = 104$)

Dependent Variable	B	SE	T	sig
Age	0.84	0.59	1.41	ns
PTSD symptoms	0.43	0.21	2.00	0.048
Total # traumas	1.68	0.49	3.45	0.001

TABLE 5. Demographic and Clinical Differences between Girls Who Completed the k-SADS-PL (N = 54) and Girls Who Did Not Complete k-SADS-PL (N = 50)

	Completed k-SADS-PL (N = 54)	Did Not Complete k-SADS-PL (N = 50)	X ² /t	P
Age (mean, sd)	16.6 (1.4)	17.9 (1.4)	4.83	<.001
Ethnicity (N, (%))				
Caucasian	3 (5.5)	0 (0)	3.47	ns
African-American	44 (81.4)	44 (88)		
Latino/Other	8 (14.8)	5 (10)		
Exposure to Index Trauma (N %)	47 (87)	45 (90)	1.03	ns
Smokers (N, %)	21 (38.8)	22 (44)	0.48	ns
Problem Severity Score on PESQ	25.1 (9.1)	27.5 (11.1)	1.18	ns
Child and Adolescent PTSD Checklist:				
Number of PTSD symptoms endorsed				
Cluster B	1.0 (1, 2)	1.1 (1.2)	0.37	ns
Cluster C	1.5 (1.7)	1.8 (1.4)	1.10	ns
Cluster D	1.0 (1.4)	0.9 (1.0)	-0.56	ns

In this study, 70 percent of girls tried alcohol on at least one occasion. Despite gender, age, and sociodemographic differences, this number is very similar to the 74% and 76% rates of adolescents endorsing experimentation with alcohol reported in the MECA and Oregon Adolescent Depression Project (OADP) studies respectively (Kandel et al., 1999; Rohde et al., 1996). However, rates of alcohol misuse in the current sample are substantially lower than those reported in several large population-based studies. Only 11 girls (10%) admitted to using alcohol more than 20 times in the past year, whereas in the annual Monitoring the Future (MTF) study, a third of high school seniors reported having been drunk in the past month (Johnston et al., 1998).

In contrast to nicotine and alcohol, the rate of marijuana use for this sample of urban inner-city girls is higher than rates reported in community samples of adolescents. In our sample 56% of girls had tried marijuana, in contrast to 14% and 15% of community-based high school students (Kandel et al., 1999; Substance Abuse and Mental Health Administration, 1993). The frequency of marijuana use is also high. Thirty-five percent of girls stated that, at some point, they were getting high at least once a week, and 27% of girls had bought or sold drugs. Of the 54 girls who completed the psychiatric diagnostic interview, 30 percent met criteria for cannabis abuse. Thus, the present study suggests that marijuana may be a drug of choice for low socioeconomic status adolescents from inner-city settings. Other studies suggest that pertinent risk factors for marijuana use include the easy availability of drugs, opportunities to earn money by selling drugs, and the use of marijuana and other drugs by significant

adults in their neighborhoods (Centers and Weist, 1998; Luthar and D'Avanzo, 1999).

Findings from this study point to a significant relationship between nicotine use and posttraumatic stress symptomatology. Eighty-six percent of girls with PTSD smoked compared with 31 percent of traumatized girls without PTSD, and the amount of posttraumatic stress symptomatology was related to the amount of nicotine used. This strong association is in keeping with the extremely high rates of smoking (at least 60%) reported in Vietnam combat veterans with PTSD (Beckham et al., 1997). Likewise, both recreational and regular use of marijuana is significantly higher in the girls with PTSD compared with the girls without this disorder, and both the total number of qualifying traumas and degree of posttraumatic stress symptomatology predicted the degree of problematic substance use. Our findings are consistent with those studies of substance abusing teens in community-based samples (Clarke et al., 1997; Deykin and Buka, 1997) and psychiatrically hospitalized adolescents (Lipschitz et al., 2000a), all of which report significant associations between problematic substance use and PTSD in girls. The present study extends these findings to urban, inner-city, nonpsychiatric treatment-seeking, and nonsubstance abuse treatment-seeking girls.

In the subset of girls who completed the K-SADS-PL, 12 of the 15 girls with PTSD and comorbid substance abuse described onset of their PTSD symptoms before or concurrent with onset of their substance use disorder. However, the design of our study asked adolescents to report symptoms of PTSD in response to their most traumatic event. In many

instances, their most traumatic event was not the first trauma. Thus we might have underestimated the number of girls who developed PTSD before a substance use disorder. Nevertheless, development of PTSD before a substance use disorder among female adolescents participating in this and other studies (Deykin and Buka, 1997) supports a self-medication model of substance abuse in this population. In a self-medication model, substances such as alcohol and marijuana are used to cope with or counteract trauma-related symptoms such as hyperarousal, insomnia, and intrusive memories. For instance, premenopausal women with depression and PTSD due to childhood sexual abuse show greater cortisol responses to psychosocial stress compared with controls (Heim et al., 2000). Recent smoking, in turn, has been shown to suppress cortisol responses to mental stress (Tsuda et al., 1996). Alternatively, it is important to consider the possibility that chronic smoking or the abuse of other substances may promote or sustain PTSD symptoms. For example, Breslau and Klein (1999) have found support for a casual link between prior smoking and the onset of a first panic attack among young adults, while Patten et al. (2000) have found that smoking predicted the onset and persistence of sleep problems among adolescents in a dose-dependent manner.

This study has several limitations. First, our sample is not an epidemiological defined sample. Subjects included girls who were seeking routine medical treatment (annual physical exams and birth control services) at a hospital-based adolescent primary care clinic. They are, however, a nonpsychiatric treatment-seeking group and are representative both of the clinic's population and of an urban, inner-city neighborhood in general. Second, although we tried to complete diagnostic interviews on the entire sample, only 52% of subjects received a diagnostic interview. This limited our ability to report on the age of onset of the substance use disorder relative to the age of onset of PTSD within the full sample surveyed. In future studies we are planning to schedule and conduct the diagnostic interview within 1 week of the screening interview to minimize subject attrition. Third, the design of the study is cross-sectional in nature. To more accurately ascertain the age of onset of substance abuse relative to PTSD we need to conduct prospective studies and to take other factors such as family loading for substance abuse into account in our predictive models.

In summary, this study finds that urban, inner-city minority adolescent girls are at extremely high risk for experiencing at least 1 or several DSM-IV (APA, 1994) defined Criterion A traumas (primarily community violence) and that a substantial number of them (24% according to this study) develop full or partial PTSD in response to these traumas. This study also finds that these adolescent girls are experimenting with marijuana and that a fair number of them have progressed to marijuana abuse. For these girls, posttraumatic stress symptomatology and nicotine as well as mari-

juana use seems to be closely related. Thus, it will be important to understand the role that nicotine and marijuana use may play in ameliorating or promoting posttraumatic stress disorder symptoms. Additionally, clinicians working with inner-city teens with marijuana and alcohol-related problems should be cognizant of their clients' trauma histories and the possible presence of PTSD so as to plan for and implement appropriate treatment interventions.

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